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EPA

Low Concentration Organic Analytical Service for Superfund (Water Matrix)

Office of Emergency and Remedial Response
Analytical Operations\Data Quality Center (5204G)

Quick Reference Fact Sheet

Under the legislative authority granted to the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), EPA develops standardized analytical methods for the measurement of various pollutants in environmental samples from known or suspected hazardous waste sites. Among the pollutants that are of concern to EPA at such sites are a series of volatile, semivolatile, pesticide, and Aroclor compounds that are analyzed using gas chromatography coupled with mass spectrometry (GC/MS) and gas chromatography with an electron capture detector (GC/EC). The Analytical Operations\Data Quality Center (AOC) of the Office of Emergency and Remedial Response (OERR) offers an analytical service that provides data from the analysis of groundwater and drinking water type samples for organic compounds for use in the Superfund decision-making process. Through a series of standardized procedures and strict chain-of-custody, the low concentration organic analytical service produces data of known and documented quality. This service is available through the Superfund Contract Laboratory Program (CLP).

DESCRIPTION OF SERVICES

The low concentration organic analytical service provides a technical and contractual framework for laboratories to apply EPA/CLP analytical methods for the isolation, detection and quantitative measurement of 40 volatile, 60 semivolatile, and 28 pesticide/Aroclor target compounds in low concentration groundwater and drinking water type samples. The analytical service provides the methods to be used and the specific technical and contractual requirements, including quality assurance, quality control, and standard operating procedures, by which EPA evaluates the data. The data turnaround time for this contract is 14 days after laboratory receipt of the last sample in the set.

DATA USES

This analytical service provides data which EPA uses for a variety of purposes, such as determining the nature and extent of contamination at a hazardous waste site, assessing priorities for response based on risks to human health and the environment, determining appropriate cleanup actions, and determining when remedial actions are complete. The data may be used in all stages of a hazardous waste site including site inspections, Hazard Ranking System scoring, remedial investigations/feasi-bility studies, remedial design, treatability studies and removal actions. In addition, this service provides data that are available for use in Superfund enforcement/litigation activities.

ANALYTES

The analytes and quantitation limits for which this service is applicable are listed in **Table 1**. The lowest quantitation limits reportable are 1 ppb for the volatile analytes, 5 ppb for the semivolatile analytes, and 0.01 ppb for the pesticide analytes. Specific sample quantitation limits are highly matrix dependent. The list of target compounds for this service was originally derived from the EPA Priority Pollutant List of 129

Table 1. Target Compound List and Contract Required Quantitation Limits (ug/L)

VOLATILES		
1. Chloromethane 1	43. 2-Chlorophenol 5	88. Pyrene 5
2. Bromomethane 1	44. 2-Methylphenol 5	89. Butylbenzylphthalate 5
3. Vinyl chloride 1	45. 2,2'-oxybis(1-Chloropropane) 5	90. 3,3'-Dichlorobenzidine 5
4. Chloroethane 1	46. 4-Methylphenol 5	91. Benzo(a)anthracene 5
5. Methylene chloride 2	47. N-Nitroso-di-n-propylamine 5	92. Chrysene 5
6. Acetone 5	48. Hexachloroethane 5	93. bis-(2-Ethylhexy)phthalate 5
7. Carbon disulfide 1	49. Nitrobenzene 5	94. Di-n-octylphthalate 5
8. 1,1-Dichloroethene 1	50. Isophorone 5	95. Benzo(b)fluoranthene 5
9. 1,1-Dichloroethane 1	51. 2-Nitrophenol 5	96. Benzo(k)fluoranthene 5
10. cis-1,2-Dichloroethene 1	52. 2,4-Dimethylphenol 5	97. Benzo(a)pyrene 5
11. trans-1,2-Dichloroethene 1	53. bis-(2-Chloroethoxy)methane 5	98. Indeno(1,2,3-cd)pyrene 5
12. Chloroform 1	54. 2,4-Dichlorophenol 5	99. Dibenz(a,h)anthracene 5
13. 1,2-Dichloroethane 1	55. 1,2,4-Trichlorobenzene 5	100. Benzo(g,h,i)perylene 5
14. 2-Butanone 5	56. Naphthalene 5	
15. Bromochloromethane 1	57. 4-Chloroaniline 5	PESTICIDES/AROCLORS
16. 1,1,1-Trichloroethane 1	58. Hexachlorobutadiene 5	101. alpha-BHC 0.01
17. Carbon Tetrachloride 1	59. 4-Chloro-3-methylphenol 5	102. beta-BHC 0.01
18. Bromodichloromethane 1	60. 2-Methylnaphthalene 5	103. delta-BHC 0.01
19. 1,2-Dichloropropane 1	61. Hexachlorocyclopentadiene 5	104. gamma-BHC (Lindane) 0.01
20. cis-1,3-Dichloropropene 1	62. 2,4,6-Trichlorophenol 5	105. Heptachlor 0.01
21. Trichloroethene 1	63. 2,4,5-Trichlorophenol 20	106. Aldrin 0.01
22. Dibromochloromethane 1	64. 2-Chloronaphthalene 5	107. Heptachlor epoxide 0.01
23. 1,1,2-Trichloroethane 1	65. 2-Nitroaniline 20	108. Endosulfan I 0.01
24. Benzene 1	66. Dimethylphthalate 5	109. Dieldrin 0.02
25. trans-1,3-Dichloropropene 1	67. Acenaphthyene 5	110. 4,4'-DDE 0.02
26. Bromoform 1	68. 2,6-Dinitrotoluene 5	111. Endrin 0.02
27. 4-Methyl-2-pentanone 5	69. 3-Nitroaniline 20	112. Endosulfan II 0.02
28. 2-Hexanone 5	70. Acenaphthene 5	113. 4,4'-DDD 0.02
29. Tetrachloroethane 1	71. 2,4-Dinitrophenol 20	114. Endosulfan sulfate 0.02
30. 1,1,2,2-Tetrachloroethane 1	72. 4-Nitrophenol 20	115. 4,4'-DDT 0.02
31. 1,2-Dibromoethane 1	73. Dibenzofuran 5	116. Methoxychlor 0.10
32. Toluene 1	74. 2,4-Dinitrotoluene 5	117. Endrin ketone 0.02
33. Chlorobenzene 1	75. Diethylphthalate 5	118. Endrin aldehyde 0.02
34. Ethylbenzene 1	76. 4-Chlorophenyl phenyl ether 5	119. alpha-Chlordane 0.01
35. Styrene 1	77. Fluorene 5	120. gamma-Chlordane 0.01
36. Xylenes (total) 1	78. 4-Nitroaniline 20	121. Toxaphene 1.0
37. 1,3-dichlorobenzene 1	79. 4,6-Dinitro-2-methylphenol 20	122. Aroclor-1016 . . . . . 0.20
38. 1,4-Dichlorobenzene 1	80. N-Nitrosodiphenylamine 5	123. Aroclor-1221 . . . . . 0.40
39. 1,2-Dichlorobenzene 1	81. 4-Bromophenyl phenyl ether 5	124. Aroclor-1232 . . . . . 0.20
40. 1,2-dibromo-3-chloropropane 1	82. Hexachlorobenzene 5	125. Aroclor-1242 . . . . . 0.20
	83. Pentachlorophenol 20	126. Aroclor-1248 . . . . . 0.20
SEMIVOLATILES	84. Phenanthrene 5	127. Aroclor-1254 . . . . . 0.20
41. Phenol 5	85. Anthracene 5	128. Aroclor-1260 . . . . . 0.20
42. bis-(2-Chloroethyl)ether 5	86. Di-n-butylphthalate 5	
	87. Fluoranthene 5	

compounds. In the years since the inception of the CLP, compounds have been added to and deleted from the Target Compound List, based on advances in analytical methods, evaluation of method performance data, and the needs of the Superfund program.

For water samples other than low concentration groundwater and drinking water type samples, use of the multi-media, multi-concentration organic analytical service is recommended.

METHODS AND INSTRUMENTATION

For semivolatile and pesticide/Aroclor samples, a 1-L water sample is extracted with methylene chloride. The water sample is extracted with methylene chloride. The extract is concentrated, subjected to fraction-specific cleanup procedures, and analyzed by GC/MS for semivolatiles or GC/ECD for pesticides/Aroclors.

For volatiles, 25 mL of water is added to a purge and trap device and purged with an inert gas at room

temperature. The volatiles purged from the sample are trapped on a solid sorbent. They are subsequently desorbed by rapidly heating the sorbent and then introduced into a GC/MS system. **Table 2** summarizes the instruments and methods used in this analytical service.

DATA DELIVERABLES

Data deliverables for this service include hardcopy data reporting forms and supporting raw data. The laboratory must submit data to EPA within 14 days of sample receipt. EPA then checks the data for compliance with contract requirements within 10 days and adds the data to a comprehensive database of CLP analytical results. A report of instances of noncompliance is distributed to the laboratory and the Region. The laboratory has 10 days to reconcile defective data and resubmit the data to EPA. EPA then screens the data within 10 days and sends a final report to the laboratory and the Region.

QUALITY ASSURANCE

The quality assurance (QA) process consists of management review and oversight at the planning, implementation, and completion stages of the environmental data collection activity, to ensure that the data provided are of the quality required. During the implementation of the data collection effort, QA activities ensure that the quality control (QC) system is functioning effectively, and that the deficiencies uncovered by the QC system are corrected. After environmental data are collected, QA activities focus on assessing the quality of data to determine its suitability to support enforcement or remedial decisions.

Each contract laboratory prepares a quality assurance plan (QAP) with the objective of providing sound analytical chemical measurements. The QAP must specify the policies, organization, objectives, and functional guidelines, as well as the QA and QC activities designed to achieve the data quality requirements for this analytical service.

QUALITY CONTROL

The analytical data acquired from QC procedures are used to estimate and evaluate the analytical results and to determine the necessity for or the effect of corrective action procedures. The QC process includes those activities required during analytical data collection to produce the desired data quality and to document the quality of the collected data. The QC operations required for this analytical service are shown in **Table 3**.

PERFORMANCE MONITORING ACTIVITIES

Laboratory performance monitoring activities are provided primarily by AOB and the Regions to ensure that contract laboratories are producing data of the appropriate quality. EPA performs on-site laboratory audits, data package audits and GC/MS tape audits, and evaluates laboratory performance on specific samples.

Table 2. Instruments and Methods

Fraction	Instrument	Method
Volatiles	GC/MS with purge and trap device	Purge and trap concentration followed by capillary GC/MS analysis
Semivolatiles	GC/MS	Liquid-liquid extraction followed by capillary GC/MS analysis
Pesticides/Aroclors	GC/ECD	Liquid-liquid extraction followed by capillary GC/ECD analysis

Table 3. Frequency of QC Operations

QC Operation	Frequency
Surrogate	Added to each sample, standard, and blank
Method blanks (volatiles)	Prepared each day
Method blanks (semivolatiles and pesticides)	Prepared with each group of samples each time samples are extracted
Instrument Blanks	Every 12 hours for each instrument used for analysis
Holding Blanks (volatiles)	Prepared and stored with each group of samples received from the field
GC/MS mass calibration and ion abundance patterns (volatiles and semivolatiles)	Every 12 hours, for each instrument used for analysis
GC resolution check (pesticides)	Prior to initial calibration on each instrument used for analysis
Initial calibration	Upon initial set up of each instrument, and each time continuing calibration fails to meet the acceptance criteria
Continuing calibration	Every 12 hours, for each instrument used for analysis
Stability of internal standard responses (volatiles and semivolatiles)	Every analysis
Retention time stability	Every analysis
Laboratory Control Samples	One LCS for every 20 or fewer samples

For more information on this analytical service, contact:

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